

WHAT IS CLAIMED IS:

- 1                   1.     A data storage system comprising:  
2                   at least one data storage canister, each data storage canister  
3 comprising:  
4                   a shell;  
5                   a frame disposed within the shell, the frame extending in a lengthwise  
6 direction along the shell;  
7                   a plurality of mounting points disposed along the frame, each  
8 mounting point capable of accepting one module of uniform size, the mounting  
9 points spaced such that mounted modules are mounted in a parallel, spaced apart  
10 manner;  
11                  a connector system operative to pass electrical signals through the  
12 shell;  
13                  a power bus interconnected to the connector system, the power bus  
14 operative to deliver power to each module;  
15                  a communication interconnect system operative to transfer signals  
16 between each mounted module and the connector; and  
17                  a plurality of data storage modules, each data storage module  
18 mounted at one of the plurality of mounting points, each data storage module in  
19 electrical contact with the connector system, the power bus and the communication  
20 interconnect system.
- 1                   2.     The data storage system of claim 1 wherein at least one  
2 canister further comprises a retention system for seating the canister within the data  
3 storage system.
- 1                   3.     The data storage system of claim 1 wherein at least one  
2 canister further comprises a lock for holding the canister within the data storage  
3 system.
- 1                   4.     The data storage system of claim 1 wherein at least one  
2 canister further comprises:

3                   vent openings on the canister back side, the vent openings admitting  
4   cooling air; and  
5                   a movable flap covering the vent openings when the canister is not  
6   within the data storage system.

1                   5.     The data storage system of claim 1 wherein at least one  
2   canister further comprises a label mounted to the canister, the label including  
3   information specific to the plurality of data storage modules held within the canister.

1                   6.     The data storage system of claim 1 wherein at least one shell  
2   comprises a shock absorbing frame.

1                   7.     The data storage system of claim 1 wherein the plurality of  
2   canisters have a standard length, at least one short length canister having a length  
3   shorter than the standard length, the data storage system further comprising at least  
4   one canister extender that attaches to the back of a short length canister to provide  
5   electrical connections and air flow to the short length canister.

1                   8.     The data storage system of claim 1 wherein the plurality of  
2   data storage modules comprises a plurality of disk drives with data storage disks.

1                   9.     The data storage system of claim 1 wherein the frame  
2   comprises a printed circuit board.

1                   10.    The data storage system of claim 1 wherein the frame  
2   comprises at least one flexible cable.

1                   11.    The data storage system of claim 1 wherein the frame  
2   comprises a plurality of manifolds encasing the plurality of data storage modules.

3                   12.    The data storage system of claim 1 further comprising a data  
4   storage rack forming secondary packaging for holding more than several canisters.

1                   13.     The data storage system of claim 1 further comprising a  
2 module docking station forming secondary packaging for no more than several  
3 canisters.

1                   14.     The data storage system of claim 1 wherein at least one  
2 canister further comprises an access port providing access to one of the plurality of  
3 data storage modules held within the canister.

1                   15.     The data storage system of claim 1 wherein at least one  
2 canister automatically recognizes capabilities of secondary packaging within the data  
3 storage system to which the canister is connected.

1                   16.     The data storage system of claim 1 further comprising a  
2 controller hierarchy, the controller hierarchy comprising:  
3                   a canister level representing the operation of storage modules within  
4 each canister;  
5                   an adapter level formatting data moving between the storage modules  
6 and the remainder of the data storage system;  
7                   a controller level providing high-level interface functions; and  
8                   a host level representing data producers and consumers accessing  
9 storage held within the storage modules.

1                   17.     The data storage system of claim 1 wherein at least one  
2 canister further comprises a processor separate from the plurality of data storage  
3 modules, the processor in electrical contact with the connector system, the power  
4 bus and the communication interconnect system.

1                   18.     The data storage system of claim 1 wherein the data storage  
2 system forms a plurality of virtual volumes, each virtual volume having storage  
3 requirements different than the physical resources provided within a single canister.

1                   19.     The data storage system of claim 1 wherein the plurality of  
2 canisters is a first plurality of canisters, the data storage system further comprising

3 a second plurality of canisters, each canister in the second plurality of canisters  
4 having at least one performance characteristic substantially improved over the at  
5 least one corresponding performance characteristic in the first plurality of canisters,  
6 the data storage system operative to transfer data from at least one of the canisters  
7 in the first set of canisters to at least one of the canisters in the second set of  
8 canisters.

1 20. The data storage system of claim 1 further comprising a  
2 docking station accepting one of the plurality of canisters, the docking station  
3 operative to communicate with a plurality of appliances.

1 21. The data storage system of claim 1 wherein the canister  
2 further comprises a user interface.

1 22. The data storage system of claim 1 wherein data storage  
2 modules are dynamically allocated.

1 23. The data storage system of claim 1 wherein at least one  
2 canister provides variable bandwidth access to data storage modules within the  
3 canister.